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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/071,889   | 02/07/2002  | William E. Moerner   | S00-231             | 8684             |
| 30869  | 7590        | 06/05/2003           |                     |                  |
| LUMEN INTELLECTUAL PROPERTY SERVICES<br>2345 YALE STREET<br>SUITE 200<br>PALO ALTO, CA 94306 |             |                      | EXAMINER            |                  |
|  |             |                      | AL NAZER, LEITH A   |                  |
|  |             | ART UNIT             | PAPER NUMBER        |                  |
|  |             | 2828                 |                     |                  |

DATE MAILED: 06/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/071,889             | MOERNER ET AL.      |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Leith A Al-Nazer       | 2828                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_.  
 2a) This action is FINAL.                  2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-50 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_ is/are allowed.  
 6) Claim(s) 1-50 is/are rejected.  
 7) Claim(s) \_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

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#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 11) The proposed drawing correction filed on \_\_\_\_ is: a) approved b) disapproved by the Examiner.  
 If approved, corrected drawings are required in reply to this Office action.  
 12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
 \* See the attached detailed Office action for a list of the certified copies not received.  
 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
 a) The translation of the foreign language provisional application has been received.  
 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                           | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____   |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 . | 6) <input type="checkbox"/> Other:  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The following two references, although listed from PTO-1449, were not considered because a copy was not present in the file: "
  - a. Special Issue on quantum information, Phys. World 11 (3) 1998
  - b. Bennett C.H. et al. (1992), "Quantum Cryptography," Sci. Am. 267 (4): 50-57

### ***Claim Objections***

2. Claim 45 is objected to because of the following informalities: Claim 45 depends from itself. For the purposes of examination, Examiner has assumed that claim 45 depends from claim 44. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 3, 18, 31-34, and 37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3, 18, and 37 recite a "vibrational manifold." This is not a generic term in the art, and therefore, it should be defined in the respective claims.

Claims 31-34 are rejected under 35 U.S.C. 112, second paragraph, for failing to provide the necessary structural elements to properly conform the invention. For example, claims 31-34 recite optical pumping of a single molecule in a solid at room temperature. However, the claims fail to provide the necessary elements to perform such a function.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-50 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishikawa '046.

With respect to claims 1, 3, 16, 18, and 37, Ishikawa teaches a device for generating single photons one at a time at room temperature, comprising a single molecule and a light source for delivering a light pulse to the single molecule to excite the single molecule to an excited state after which the single molecule emits the single photon.

With respect to claims 2, 17, and 36, Ishikawa teaches means for directing the light pulse to the single molecule (figure 20).

With respect to claims 4 and 19, Ishikawa teaches means for collecting the single photon (40, 52, 54, and 56 in figure 20).

With respect to claims 5, 6, 20, 21, 38, and 39, Ishikawa teaches a fluorescent molecule having a high quantum yield for photon emission (column 2, lines 41-52).

With respect to claims 7-10, 22-25, and 40-43, Ishikawa teaches the single molecule being a terrylene molecule, a derivative of the terrylene molecule, a dibenzoanthanthrene molecule, a derivative of the dibenzoanthanthrene molecule, a pentacene molecule, a derivative of the pentacene molecule, a perylene molecule, or a derivative of the pentacene molecule (column 1, line 65 – column 2, line 9).

With respect to claims 11, 13, 14, 26, 28, 29, 44, 46, and 47, Ishikawa teaches the single molecule in a solid host (column 1, line 65 – column 2, line 5).

With respect to claims 12, 27, and 45, Ishikawa teaches the solid host being p-terphenyl (column 2, line 1).

With respect to claims 15, 30, and 48, Ishikawa teaches the light source being a pulsed pumping laser (30).

With respect to claim 31, Ishikawa teaches a controllable source of single photons generated one at a time using optical pumping of a single molecule in a solid at room temperature (column 16, lines 17-30).

With respect to claim 32, Ishikawa teaches a single photon obtained by optical pumping of a single molecule in a solid at room temperature (column 16, lines 17-30).

With respect to claim 33, Ishikawa teaches a source of single photons obtained one at a time at room temperature by pulsed optical excitation of a single highly fluorescent molecule (column 2, lines 41-52; column 16, lines 17-30).

With respect to claim 34, Ishikawa teaches a single photon obtained by a pulsed optical excitation of a single highly fluorescent molecule at room temperature (column 2, lines 41-52; column 16, lines 17-30).

With respect to claims 35, 49, and 50, Ishikawa teaches a system for collecting single photons one at a time at room temperature, comprising a single molecule, a light source for delivering a light pulse to the single molecule to excite the single molecule to an excited state after which the single molecule emits the single photon, and a means for collecting the single photon (column 15, lines 10-30).

7. Claims 1-6, 15-21, 30, 33-39, 48, and 49 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuhn et al.

With respect to claims 1, 3, 16, 18, and 37 Kuhn teaches a device for generating single photons one at a time at room temperature, comprising a single molecule (figure 1) and a light source for delivering a light pulse to the single molecule to excite the single molecule to an excited state after which the single molecule emits the single photon.

With respect to claim 2, 17, and 36, Kuhn teaches means for directing the light pulse to the single molecule.

With respect to claims 4 and 19, Kuhn teaches a means for detecting the single photon, and therefore, Kuhn inherently teaches a means for collecting the single photon.

With respect to claims 5, 6, 20, 21, 38, and 39, Kuhn teaches a fluorescent molecule having a high quantum yield for photon emission.

With respect to claims 15, 30, and 48, Kuhn teaches the light source being a pulsed pumping laser (page 373, first column – page 374, second column).

With respect to claim 33, Kuhn teaches a source of single photons obtained one at a time at room temperature by pulsed optical excitation of a single highly fluorescent molecule.

With respect to claim 34, Kuhn teaches a single photon obtained by a pulsed optical excitation of a single highly fluorescent molecule at room temperature.

With respect to claim 35, Kuhn teaches a system for collecting single photons one at a time at room temperature, comprising a single molecule, a light source for delivering a light pulse to the single molecule to excite the single molecule to an excited state after which the single molecule emits the single photon, and a means for collecting the single photon.

With respect to claim 49, Kuhn teaches the means for collecting comprising an optical cavity resonator (abstract).

8. Claims 1-10, 15-17, 20-25, 30, 33-43, and 48 are rejected under 35 U.S.C. 102(b) as being anticipated by Brunel.

With respect to claims 1, 3, 16, 18, and 37, Brunel teaches a device for generating single photons one at a time at room temperature, comprising a single molecule and a light source for delivering a light pulse to the single molecule to excite the single molecule to an excited state after which the single molecule emits the single photon (page 2722).

With respect to claims 2, 17, and 36, Brunel teaches means for directing the light pulse to the single molecule (figure 1).

With respect to claims 4 and 19, Brunel teaches means for collecting the single photon (figure 1).

With respect to claims 5, 6, 20, 21, 38, and 39, Brunel teaches a fluorescent molecule having a high quantum yield for photon emission (page 2722, first column).

With respect to claims 7-10, 22-25, and 40-43, Brunel teaches the single molecule being a terrylene molecule, a derivative of the terrylene molecule, a dibenzoanthanthrene molecule, a derivative of the dibenzoanthanthrene molecule, a pentacene molecule, a derivative of the pentacene molecule, a perylene molecule, or a derivative of the pentacene molecule (page 2722, bottom of second column).

With respect to claims 15, 30, and 48, Brunel teaches the light source being a pulsed pumping laser (page 2722, bottom of first column – page 2722, top of second column).

With respect to claim 33, Brunel teaches a source of single photons obtained one at a time at room temperature by pulsed optical excitation of a single highly fluorescent molecule (page 2722, first column).

With respect to claim 34, Brunel teaches a single photon obtained by a pulsed optical excitation of a single highly fluorescent molecule at room temperature (page 2722, first column).

With respect to claim 35, Kuhn teaches a system for collecting single protons one at a time at room temperature, comprising a single molecule, a light source for delivering a light pulse to the single molecule to excite the single molecule to an excited state after which the single molecule emits the single photon, and a means for collecting the single photon (figure 1).

***Communication Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leith A Al-Nazer whose telephone number is 703-305-2717. The examiner can normally be reached on Monday-Friday 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on 703-308-3098. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7724 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3329.

LA  
May 23, 2003

*Paul IP*  
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